

3.20 Applications of Vectors

Name _____ Date _____ Period _____

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

In each case, find the magnitude of the resultant force and the angle between the resultant and each force. Round to the nearest tenth.

1) Two forces of 3 lb and 8 lb act on an object at right angles. 1) _____

2) Two forces of 4.2 N and 10.3 N (newtons) act on an object. The angle between the forces is 130° . 2) _____

3) Two forces of 34 N and 23 N (newtons) act on an object. The angle between the forces is 100° . 3) _____

Solve the problem.

4) A force of 689 lb is required to pull a boat up a ramp inclined at 16.0° with the horizontal. How much does the boat weigh? 4) _____

5) One rope pulls a barge directly east with a force of 45 N, and another rope pulls the barge directly north with a force of 68 N. Find the magnitude of the resultant force acting on the barge. 5) _____

6) Magnitude of a Force

The resultant of a 10-lb force and another force has a magnitude of 12.3 lb at an angle of 23.4 degrees with the 10-lb force. Find the magnitude of the other force and the angle between the two forces.

6) _____

7) Magnitude of a Force

The resultant of a 15-lb force and another force has a magnitude of 9.8 lb at an angle of 31 degrees with the 15-lb force. Find the magnitude of the other force and the angle between the two forces.

7) _____

8) Pushing a Shopping Cart

Ronnie, Phyllis, and Ted are conducting a vector experiment in a Wal-Mart parking lot. Ronnie is pushing a cart containing Phyllis to the east at 5 mph while Ted is pushing it north at 3 mph. What is Phyllis's speed and in what direction (measured from north) is she moving?

8) _____

9) Rock and Roll

In Roman mythology, Sisyphus, king of Corinth, revealed a secret of Zues and thus incurred the god's wrath. As punishment, Zues banished him to Hades where he was doomed for eternity to roll a rock uphill, only to have it roll back on him. If Sisyphus stands in front of a 4000-lb sphyerical rock on a 20 degree incline, what force applied in the direction of incline would keep the rock from rolling down the incline?

9) _____

10) Super Force

If Superman exerts 1000 pounds of force to prevent a 5000-lb boulder from rolling down a hill and crushing a bus full of children, then what is the angle of inclination of the hill?

10) _____

11) Due East

A plane is headed due east with an air speed of 240 mph. The wind is from the north at 30 mph. Find the bearing for the course and the ground speed of the plane.

11) _____

12) Due West

A plane is headed due west with an air speed of 300 mph. The wind is from the north at 80 mph. Find the bearing for the course and the ground speed of the plane.

12) _____

13) Course of an Airplane

An airplane is heading on a bearing of 102 degrees with an air speed of 480 mph. If the wind is out of the northwest (bearing 225 degrees) at 58 mph, then what are the bearing of the course and the ground speed of the airplane?

13) _____

14) Course of a Helicopter

The heading of a helicopter has a bearing of 240 degrees. If the 70-mph wind has a bearing of 185 degrees and the air speed of the helicopter is 195 mph, then what are the bearing of the course and the ground speed of the helicopter?

14) _____

15) Find the smallest positive angle between the vectors $\langle -3, 5 \rangle$ and $\langle 1, 6 \rangle$.

15) _____

16) A tall building casts a shadow of length 230 feet when the angle of elevation of the sun is 48 degrees. Find the height of the building.

16) _____